finds it on pottery, in north Europe on bronze sword-handles. In each case the *motif* is decorative, and so is found on the most highly prized objects. In mid-Europe pottery, so he argues, was the most valued article, bronze not yet being known when the *motif* arrived. By the time the *motif* reached the north, the Bronze age had begun.

These arguments are more ingenious than weighty; they derive their importance from the fact that they all—or nearly all—support the contention that the culture of Europe came from the south.

Dr. Müller sees no evidence of any hiatus in man's occupation of Europe. He places the end of the Palæolithic period at a date 10,000 years ago. He accepts Piette's mesolithic phase and Pigorini's conclusion that in Italy the Moustier period passed without interruption into the Neolithic.

He discusses at considerable length the various late prehistoric periods, the Mycenæan, Dipylon, Villanova, Halstatt and la Têne. The book possesses 161 illustrations and three coloured plates; it is well printed and well planned. Its chief defect is that it is not in some respects quite up-to-date.

William Wright.

CHEMICAL RESEARCH.

Untersuchungen in der Puringruppe (1882–1906.) By Emil Fischer. Pp. viii+608. (Berlin: Julius Springer, 1907.) Price 15 marks.

ORGANIC chemistry during the last twenty years has progressed with such marvellous rapidity that it is quite impossible for the modern chemist to keep in touch with every phase of the present-day movement. The old subdivision of the investigator into the classes inorganic and organic is no longer sufficient to indicate clearly the course followed by any individual worker. Every branch of chemistry is split up into innumerable microscopic divisions, each of which claims its own adherents. Further than this, the botanist, the biologist, and others are encroaching on the domain of pure chemistry, and demand a knowledge of the compounds related to their own particular science. Bearing these facts in mind, it follows as a natural consequence that such books as the present one find so welcome a position in the standard literature of chemistry.

The present volume contains the entire experiments of E. Fischer and his students for the last twenty-four years, and deals entirely with the purine group, including the brilliant syntheses of uric acid, xanthine, caffein, and allied compounds. The introduction, comprising the first eighty pages, appeared in the German literature in 1899 under the title of "Synthesen in der Puringruppe," and is well known to all students of chemistry. At this time the systematic study of the purine group had reached a definite issue, and since then no new principle has been evolved. The later work has been devoted to details, with perhaps the exception of one paper, which treats of the isomerism of methyl uric acids. The contents of this first chapter is almost complete, and gives a full survey of the subject as it is known to-day. Following this is the second part of the book, which contains the forty-seven publications of the author and his students. The first forty contain the work previous to 1899, while the remaining seven have been published subsequent to the compilation of the introduction. These papers contain the complete experimental data of the originals, and are given in the order of publication. It is quite impossible to read this book without marvelling at the wonderful fertility of the brain of this modern genius. No problem seems to be too great for his inventive faculty. Even the incomplete work of Baeyer receives new life in his hands. It is not with the purine derivatives only that one associates the name of E. Fischer, but many other groups have been added to the list.

It will be remembered that the author published his book on the amido-acids and proteins about a year ago. The success of this volume is the direct cause of the present one, which was written with the same object as the former. The literature on the subject is contained in various journals, and these are not always accessible to students of science. The demands of modern science, on the other hand are such that it is of vital importance to be able to acquire a detailed knowledge of many highly specialised subjects without any great inconvenience. The literature of the biologist, for example, is already voluminous enough to require his whole attention without having to keep in touch with chemical developments. For such students this book was originally intended, and these will undoubtedly feel grateful to the author. These, however, are not the only men of science who owe gratitude to E. Fischer. Every modern chemist should read this book, not only for the individual results, but to gain a better knowledge of the wonderful methods of manipulation employed. These are of general importance. Throughout, the well-worn track of modern methods is employed, but, as a rule, small alterations —vital to success—are made. It is here that the special genius of the author is seen at its best, for which the whole of the scientific world must express its thanks.

OUR BOOK SHELF.

Iron and Steel. By J. H. Stansbie. Pp. xiii+375. (London: Archibald Constable and Co., Ltd., 1907.) Price 6*s.* net.

During the last few years so many elementary books on iron and steel have been published that it would almost appear that an addition to the long list was unnecessary. Mr. Stansbie's book is, however, an excellent one. Written from the notes of his lectures to students of the Birmingham Municipal Technical School, it gives as comprehensive a view as its limits permit of the modern aspects of iron and steel manufacture, together with historical details sufficient to enable the student to follow the march of progress. It is printed in clear type, and the eighty-six illustrations, although they would have been improved by an indication of the scale, are well chosen and well adapted to indicate to students the construction of the furnaces described.

In arrangement of the subject-matter, the work differs but slightly from many of its predecessors. An introductory chapter on chemical principles is fol-

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lowed by chapters on iron ores and fuels, primitive methods of iron and steel production, pig iron and its manufacture, the refining of pig iron in small charges, crucible and weld steel, the Bessemer process, the open-hearth process, mechanical treatment of iron and steel, physical properties of iron and steel, iron and steel under the microscope, heat treatment of iron and steel, electric smelting, and special steels. The information given has been brought up to date by reference to the latest books and to papers read before the Iron and Steel Institute. The book is commendably free from misprints. The names of Brinell and Legénisel are, however, wrongly spelt; and there appears to be some inaccuracy in the statement that an American blast furnace producing 800 tons of Bessemer pig iron in twenty-four hours would yield 1200 tons of slag during that period. The author probably intended to have said that the furnace would yield 1200 lb. of slag per ton of pig iron made.

L'Énergétique et le Méchanisme au Point de Vue des Conditions de la Connaissance. By Abel Rey. Pp. 187. (Paris: Félix Alcan, 1908.) Price 2.50 francs.

In a former work, recently noticed in these columns, M. Rey analysed contemporary physical theories with the object of showing that, in spite of profound differences of procedure, they all bear witness to a common basis of assured experiential fact. In the present book he considers the two rival points of view under which modern theories are ranged—those of the Newtonian mechanics and of the newer energetics—with the more practical purpose of determining whether either of them possesses intrinsic superiority over the other.

There are two fundamental laws of progress in knowledge—it advances by repeated assimilation of the unknown to the known, and with constantly rhythmic alternation of generalisation and deduction. The progressive interpretation of the physical aspect of nature by the concepts of the traditional mechanics complies with each of these laws, while energetics, which seeks merely a single formula from which the established particulars of experience may be formally deduced, runs counter to both. Thus the former alone can be permanently an efficient instrument of investigation.

This, in brief, is M. Rey's thesis. It need be added only that it is worked out in a very interesting manner, and with a competence that should render his study of equal value to the man of science and the epistemologist. T. P. N.

Abel's Laboratory Handbook of Bacteriology. Translated from the tenth German edition by Dr. M. H. Gordon; with additions by Dr. A. C. Houston, Dr. T. G. Horder, and the Translator. (Oxford Medical Publications.) Pp. xi+224. (London: Henry Frowde, and Hodder and Stoughton, 1907.) Price 5*s.* net.

The fact that Abel's handbook of bacteriology has reached its tenth German edition is sufficient proof that it fulfils a useful purpose, and the appearance of this translation will render it available for British and American laboratories. It is just the book for the laboratory table, giving the practical details which are so often required immediately to hand, and the binding in glazed covers will render it less liable to be soiled. The work of British investigators is adequately noticed, and the section on the examination of water, milk, shell-fish, &c., is contributed by Dr. Houston, a sure guarantee of its trustworthiness. The translation is sometimes a little clumsy, *e.g.* "salad" potatoes (p. 26). The culture of the glanders bacillus on potato is inadequately and incorrectly described, and the proof reading has evidently been carelessly done. Thus NaCL for NaCl, and HCL for HCl occur several times, and the iodine solution used in Nicolle's modification of Gram's method is stated to have the following composition:—$1K+2Ki+200$ Aq. (for $1I+2KI+200$ Aq.). Apart from such small blemishes, the book can be recommended as a most useful laboratory guide. R. T. Hewlett.

Die Bestimmung und Vererbung des Geschlechtes. By Dr. C. Correns. Pp. v+81. (Berlin: Gebrüder Borntraeger, 1907.) Price 1.50 marks.

In this volume, Dr. Correns makes another contribution to the subject that he has studied for many years, of hybrids and their hereditary characters. An attempt is made to throw some light on sex tendency in germ cells, to discover the stage at which the sex-character is determined, and to find out whether sex tendency appears to conform to Mendelian laws, or, in Mendelian phraseology, whether sex may not be a consequence of gametic segregation. The method has been to raise hybrids, using for one or both parents monœcious or diœcious plants. The earlier experiments were made with the monœcious *Bryonia alba* and the diœcious *Bryonia dioica*. When pollen of the former was applied to stigmas of the latter, the resulting plants were female, some few showing traces of monœcism. The converse produced half male hybrids, half female, but most of the latter showed a tendency to monœcism. Sterility of this first generation put a stop to further experiments. A result was also obtained by pollinating the flowers of *Melandrium album* with pollen from *Silene viscosa.* From his interpretation of the results, Dr. Correns concludes that sex determination is a simple inheritance phenomenon conforming to Mendelian laws of segregation; that the females are homozygotes, the males are heterozygotes. This last supposition is, however, opposed to the idea postulated by Castle that no sex characters are homozygous. Apart from the Mendelian argument, the reader will find some suggestive remarks with regard to the inheritance of sexual characters.

Lehrbuch der Physik. By Prof. H. A. Lorentz. Translation from the Dutch by G. Siebert. Second volume. Pp. iv+621. (Leipzig: J. A. Barth, 1907.) Price 10 marks.

This is a translation from the fourth Dutch edition of Prof. Lorentz's text-book. The mastery of the author over the facts of physics is, of course, a guarantee of the excellence of the exposition. The contents of this volume are connected with sound, light, electricity, and magnetism. The treatment is exceedingly simple; if we have any criticism to make it is that most students, even though not taking up physics as one of the principal subjects of their study, would like to learn more than the book offers. In other words, we think that in many places the treatment is unnecessarily meagre. We are sure that the chemist would like to be told more about theories of the voltaic cell. The large amount of work that has been done by physical chemists under the leadership of Ostwald and Nernst is left absolutely unnoticed.

We turn naturally to the chapter at the end on the electron theory. Here, as elsewhere, what there is is excellent; but we feel that we expected more on this subject from Prof. Lorentz. There are so many phenomena known now which are capable of being simply described and used in illustration and support of the modern fluid theory of electricity. This scantiness will probably tell against the book competing with others of a similar grade, in England at any rate.

A collection of 72 examples appears at the end; solutions are not given to these. There are also fifteen useful tables of data.

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